

## SE Learning Task: THE REPEATER vs. THE TERMINATOR

### Part One

The chart below includes 13 unit fractions, fractions with a numerator of 1. For this activity, first determine the prime factorization of the denominator of the unit fraction. Then, turn the fraction into a decimal and determine whether the fraction is repeating or terminating.

UNIT FRACTION	PRIME FACTORIZATION OF DENOMINATOR	DECIMAL FORM	TERMINATES OR REPEATS
$\frac{1}{2}$	PRIME	.5	Terminates
$\frac{1}{3}$	PRIME	$.3\bar{}$	Repeats
$\frac{1}{4}$	$2 \cdot 2$		Terminates
$\frac{1}{5}$			
$\frac{1}{6}$		$.1\bar{6}$	Repeats
$\frac{1}{7}$			
$\frac{1}{8}$	$2 \cdot 2 \cdot 2$		
$\frac{1}{9}$		$.1\bar{}$	
$\frac{1}{10}$			Terminates
$\frac{1}{11}$			
$\frac{1}{12}$			
$\frac{1}{13}$	PRIME		

Answer the following questions based upon your results from the chart.

1. Which fractions terminate?
2. What do you notice about the types of fractions that can be turned into terminating decimals? (Hint: Look at the prime factorization of the denominators)
3. Give another example of a fraction that can be turned into a terminating decimal. Justify why this fraction is a terminating decimal.
4. Consider the fractions  $\frac{1}{3}$ ,  $\frac{1}{7}$ , and  $\frac{1}{11}$ . What do these fractions have in common?
5. What can you conclude about rational numbers with denominators that are prime numbers?

**Part Two**

Convert the following fractions into decimals. (You have calculated a few of them before!)

Fraction	Decimal	Fraction	Decimal	Fraction	Decimal	Fraction	Decimal
$\frac{1}{4}$		$\frac{1}{8}$		$\frac{1}{9}$		$\frac{1}{11}$	
$\frac{2}{4}$		$\frac{3}{8}$		$\frac{2}{9}$		$\frac{2}{11}$	
$\frac{3}{4}$		$\frac{5}{8}$		$\frac{3}{9}$		$\frac{3}{11}$	
$\frac{4}{4}$		$\frac{7}{8}$		$\frac{4}{9}$		$\frac{4}{11}$	

1. Do you notice a pattern between the fractions with denominators of 9 and their decimals? If so, what is the pattern?
2. **Without using a calculator,** what is the decimal form of  $\frac{8}{9}$ ?

3. Do you notice a pattern between the fractions with denominators of 11 and their decimals? If so, what is the pattern?

4. **Without using a calculator,** what is the decimal form of  $\frac{9}{11}$ ?